ELECTRONIC PATIENT MONITORING SYSTEM

CROSS-REFERENCES

[0001] The present application is a Continuation Application of U.S. patent application Ser. No. 13/971,258, filed Aug. 20, 2013 and entitled Electronic Patient Monitoring System, which will be U.S. Pat. No. 10,872,685, issuing on Dec. 22, 2020 (Attorney Docket No. K84), which is a Continuation Application of U.S. patent application Ser. No. 13/011,543 filed Jan. 21, 2011 and entitled Electronic patient Monitoring System, and was abandoned on Feb. 21, 2012 (Attorney Docket No. 152), which claims the benefit of prior U.S. Provisional Application No. 61/297,544, filed Jan. 22, 2010 and entitled Electronic Order Intermediation System for a Medical Facility (Attorney Docket No. H53). Each of these applications is hereby incorporated by reference herein in its entirety.

BACKGROUND

[0002] The present invention relates to systems and methods to provide electronic intermediation among medical devices delivering treatments to patients, medical devices monitoring parameters associated with those patients, and health care providers who order, process or initiate those treatments. An object of the invention is to reduce the incidence of medical treatment errors, and to improve the efficiency of tracking a patient's course of treatment.

[0003] Despite the existence of systems incorporating electronic medical records ("EMR"), and computerized provider order entry ("CPOE"), the process of ordering and delivering medical treatments still has the potential to cause critical information to be miscommunicated, to allow treatment decisions to be made without ready access to complete information, and to delay implementation of treatment orders due to unnecessarily redundant and inefficient procedures. An approach to dealing with this problem is illustrated herein by using medication ordering as an example. It should be noted, however, that the invention as described herein can be applied to other treatment or diagnostic decisions involving the care of a patient.

[0004] Medication errors may be responsible for over 300 deaths and may injure over one million people each year in the United States. Hospitals under financial stress may experience an increased incidence of medication errors. Medications associated with the most dangerous errors include insulin, narcotics, heparin and chemotherapy. Sources of error include administering the wrong drug, the wrong concentration of drug, at the wrong rate, or via the wrong route (medications can be administered orally, intravenously, intramuscularly, subcutaneously, rectally, topically to the skin, eye or ear, intrathecally, intraperitoneally or even intravesically). Even with proper orders and proper labeling, medications still can be administered improperly because of illegible handwriting, miscommunication of orders, and mispronunciation of drugs having similar names. The trend toward the use of electronic medical records (EMR), and bar coding systems for medications has been shown to reduce the incidence of medication errors. EMR systems, for example, can facilitate computerized provider order entry (CPOE), and flag orders for drugs that do not match a patient's characteristics such as diagnosis, allergies, weight or age. However, these systems have not been widely adopted, and their implementation can result in significant delays and inefficiencies in ordering, preparing and administering medications.

[0005] It has been estimated that medication infusion devices are involved in up to one third of all medication errors that result in significant harm. The wrong drug may be hung, incorrect parameters (e.g. drug concentration or rate of infusion) may be entered, or existing infusion parameters may be improperly changed. Of infusion pump-related deaths, nearly half may be due to user error, and most of these may be due to errors in programming the infusion device.

[0006] An effective Monitoring system should monitor and intercede at any phase of the medication ordering and administration process to help minimize any of a number of adverse events that could result from the treatment. The medication treatment process conceptually can be separated into three phases: a prescription phase, a medication preparation phase, and an administration phase. Errors can occur when a prescription is written or entered, when a drug is retrieved for use or mixed in solution, or when it is administered to the patient. It would be particularly desirable for a monitoring system to not significantly impair the efficiency with which medications are ordered, prepared or administered, and preferably to actually reduce the time required to perform those activities by collecting, organizing and presenting relevant real-time information to the user.

SUMMARY

[0007] In an exemplary embodiment involving the ordering and administration of medications, the Electronic Patient Monitoring system may comprise a first data-gathering module (e.g., a Monitoring Client) and a second order-input module (e.g. a fixed or portable communications device) having a user interface for transmitting an order or receiving patient-related information. The first module may be configured to receive and store measured parameters pertaining to a patient's current condition, such as blood pressure, heart rate, heart rhythm, temperature, oxygenation, respiratory rate, or ventilation, for example. The first module may also be configured to receive information about pre-existing parameters related to the patient from a first database (e.g. an EHR database containing information about the patient), including drug allergies or sensitivities, other currently administered drugs, age, weight, height, kidney or liver function, for example. The first module may also be configured to obtain medication information about the ordered medication and/or pre-existing drugs from a second database (e.g. a drug information database), such as known drug interactions, effects of the medication or pre-existing drugs on blood pressure, pulse, heart rhythm, or respirations, for example. The first module can be configured to compare the patient's currently measured parameters and received pre-existing parameters with known normal ranges, and create a table of patient parameters found to be outside the normal ranges. The first module may then compare the table of patient parameters with a table of corresponding parameters obtained from the drug information database. If a match is found to exist between the table of patient parameters and the table of corresponding parameters, the first module may then retrieve one or more pre-entered and stored messages for transmission to the second (order input) module. These messages may include, for example, warnings to a user of the second module that are appropriate for the particular